MEMORANDUM

TO: Mr. Addison Rice
Anderson, Mulholland and Associates

DATE: July 2, 2015

FROM: R. Infante

FILE: JB96432

RE: Data Validation
BMSMC, Building 5 Area, PR
SM04.00.06
Accutest Job Number: JB96432

checked by IT
7/14/15

SUMMARY

Full validation was performed on the data for several groundwater samples analyzed selected volatile organic compound by method SW846-8260B. The samples were collected at the BMSMC, Building 5 Area, Humacao, PR site on June 3-5, 2015 and submitted to Accutest Laboratories of Dayton, New Jersey that analyzed and reported the results under delivery group (SDG) JB96432.

The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: "*USEPA Region 2, SOP HW-24, Validating Volatile Organic Compounds by GC/MS, SW-846 Method 8260B (August 2009-Revision 2)*, the *USEPA National Functional Guidelines for Low Concentration Organic Data Review (August 2009-Revision 2)*, the *USEPA National Functional Guidelines for Organic Data Review for Low Concentration Water (SOP HW-13, August 2009-Revision 3)*; (noted herein as the "primary guidance documents"). Also, QC criteria from "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846 (Final Update IV, December 1998),*" are utilized. The guidelines were modified to accommodate the non-CLP methodology. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

In general the data are valid as reported and may be used for decision making purposes.

SAMPLES

FIELD SAMPLE ID	LABORATORY ID	ANALYSIS
S-33	JB96432-1	VOCs, Alcohols
S-33 MSD	JB96432-1D	VOCs, Alcohols
S-33 MS	JB96432-1S	VOCs, Alcohols
S-32	JB96432-2	VOCs, Alcohols
G-1R(3)	JB96432-3	VOCs, Alcohols
A-1R(4)	JB96432-4	VOCs, Alcohols
A-2R(2)	JB96432-5	VOCs, Alcohols
S-31R(2)	JB96432-6	VOCs, Alcohols
S-31R(2)	JB96432-7	VOCs, Alcohols
VP-1	JB96432-8	VOCs, Alcohols
TB060515	JB96432-11	VOCs

REVIEW ELEMENTS

Sample data were reviewed for the following parameters, where applicable to the method

- Agreement of analysis conducted with chain of custody (COC) form
- Holding time and sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tunes
- Initial and continuing calibrations
- Method blanks/trip blanks/field blank
- Surrogate spike recovery
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analysis Conducted with COC Request

Sample reports corresponded to the analytical request designated on the chain-of-custody form.

Holding Times and Sample Preservation

The cooler temperatures were within the QC acceptance criteria of 4°C $\pm$ 2°C.

Sample preservation was acceptable.

Samples analyzed within method recommended holding time.

GC/MS Tunes

The frequency and abundance of bromofluorobenzene (BFB) tunes were within the QC acceptance criteria. All samples were analyzed within the tuning criteria associated with the method.

Initial and Continuing Calibrations

VOCs

The percent relative standard deviations (%RSDs) and response factors (RFs) of all target analytes were within the QC acceptance criteria in the initial calibration. Correlation coefficients (r^2) of target analytes were within the QC acceptance criteria. Ongoing accuracy of the instrument was determined by the analysis of a continuing calibration standard.

Alcohols

The percent relative standard deviations (%RSDs) and response factors (RFs) of all target analytes were within the QC acceptance criteria in the initial calibration. Correlation coefficients (r^2) of target analytes were within the QC acceptance criteria. Ongoing accuracy of the instrument was determined by the analysis of a continuing calibration standard.

Method Blank/Trip Blank/Field Blank

Target analytes were not detected in laboratory method blanks for VOCs and alcohols.

No target analyte (VOCs) detected in the trip blank. No field/equipment analyzed with this data package.

Surrogate Spike Recovery

The surrogate recoveries were within the laboratory QC acceptance limits in all samples analyzed.

MS/MSD

VOCs
Matrix spike was performed on samples JB96432-1MS/-1MSD; JB96173-3MS/-3MSD; JB89632-7MS/-7MSD; JB89632-6MS/-6MSD; and JB89878-3MS/-3MSD. Recoveries for MS/MSD and RPD were within laboratory control limits except for the following:

- Acetone % RSD 24 in sample JB96432-1MS/-1MSD; control limit: + 19 %. No action taken, professional judgment % RSD within generally acceptable control limits.

Alcohols
Matrix spike was performed on samples JB96432-1MS/-1MSD and JB96432-5MS/-5MSD. Recoveries for MS/MSD and RPD were within laboratory control limits

Internal Standard Performance

VOCs
Samples were spiked with the method specified internal standard. Internal standard performance met the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Field duplicates were analyzed as part of this data set for VOCs. RPD results were within laboratory/recommended control limits.

LCS/LCSD Results

VOCs
The laboratory analyzed one LCS (blank spike) associated with each matrix from this data set. The % recoveries of all spiked analytes were within the laboratory QC acceptance limits.

Alcohols
The laboratory analyzed one LCS (blank spike) associated with each matrix from this data set. The % recoveries of all spiked analytes were within the laboratory QC acceptance limits.

Quantitation Limits and Sample Results

Dilutions were required for several samples with this data set due to analyte concentration outside the calibration range.

Calculations were spot checked.

Certification

The following samples JB96432-1; JB96432-1D; JB96432-1S; JB96432-2; JB96432-3; JB96432-4; JB96432-5; JB96432-6; JB96432-7; JB96432-8; and JB96432-9 were analyzed following standard procedures accepted by regulatory agencies. The quality control requirements met the methods criteria except in the occasions described in this document. The results are valid.

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Report of Analysis

Client Sample ID:	S-33		
Lab Sample ID:	JB96432-1	**Date Sampled:**	06/03/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U195959.D	1	06/11/15	NH	n/a	n/a	VU9037
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		76-120%
17060-07-0	1,2-Dichloroethane-D4	101%		73-122%
2037-26-5	Toluene-D8	99%		84-119%
460-00-4	4-Bromofluorobenzene	99%		78-117%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S-33		
Lab Sample ID:	JB96432-1	**Date Sampled:**	06/03/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846-8015C (DAI)	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH100304.D	1	06/08/15	XPL	n/a	n/a	GGH4888
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	100	25	ug/l	
67-56-1	Methanol	ND	200	45	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	86%		48-150%
111-27-3	Hexanol	88%		48-150%

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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S-32		
Lab Sample ID:	JB96432-2	**Date Sampled:**	06/03/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U195986.D	200	06/11/15	NH	n/a	n/a	VU9038
Run #2	U195963.D	2000	06/11/15	NH	n/a	n/a	VU9037

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	2000	660	ug/l	
71-43-2	Benzene	ND	100	47	ug/l	
100-41-4	Ethylbenzene	44500 [a]	2000	540	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	1000	200	ug/l	
108-88-3	Toluene	68.5	200	32	ug/l	J
1330-20-7	Xylene (total)	81800 [a]	2000	330	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%	100%	76-120%
17060-07-0	1,2-Dichloroethane-D4	101%	102%	73-122%
2037-26-5	Toluene-D8	100%	99%	84-119%
460-00-4	4-Bromofluorobenzene	95%	100%	78-117%

(a) Result is from Run# 2

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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GH100307.D

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Report of Analysis

Client Sample ID:	S-32		
Lab Sample ID:	JB96432-2	**Date Sampled:**	06/03/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846-8015C (DAI)	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH100307.D	1	06/08/15	XPL	n/a	n/a	GGH4888
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	100	25	ug/l	
67-56-1	Methanol	ND	200	45	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	103%		48-150%
111-27-3	Hexanol	81%		48-150%

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B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	G-1R(3)		
Lab Sample ID:	JB96432-3	**Date Sampled:**	06/03/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U195987.D	200	06/11/15	NH	n/a	n/a	VU9038
Run #2	U195965.D	2000	06/11/15	NH	n/a	n/a	VU9037

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	2000	660	ug/l	
71-43-2	Benzene	ND	100	47	ug/l	
100-41-4	Ethylbenzene	27200	200	54	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	1000	200	ug/l	
108-88-3	Toluene	154	200	32	ug/l	J
1330-20-7	Xylene (total)	87200 [a]	2000	330	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%	103%	76-120%
17060-07-0	1,2-Dichloroethane-D4	102%	101%	73-122%
2037-26-5	Toluene-D8	100%	99%	84-119%
460-00-4	4-Bromofluorobenzene	96%	99%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: GH100308.D

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Report of Analysis

Client Sample ID:	G-1R(3)		
Lab Sample ID:	JB96432-3	**Date Sampled:**	06/03/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846-8015C (DAI)	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH100308.D	1	06/08/15	XPL	n/a	n/a	GGH4888
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	100	25	ug/l	
67-56-1	Methanol	ND	200	45	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	124%		48-150%
111-27-3	Hexanol	81%		48-150%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	A-1R(4)		
Lab Sample ID:	JB96432-4	**Date Sampled:**	06/04/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U196212.D	4	06/17/15	NH	n/a	n/a	VU9047
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	14.8	40	13	ug/l	J
71-43-2	Benzene	4.9	2.0	0.94	ug/l	
100-41-4	Ethylbenzene	356	4.0	1.1	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	20	4.0	ug/l	
108-88-3	Toluene	1.1	4.0	0.65	ug/l	J
1330-20-7	Xylene (total)	1210	4.0	0.66	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		76-120%
17060-07-0	1,2-Dichloroethane-D4	94%		73-122%
2037-26-5	Toluene-D8	93%		84-119%
460-00-4	4-Bromofluorobenzene	87%		78-117%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	A-1R(4)		
Lab Sample ID:	JB96432-4	**Date Sampled:**	06/04/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846-8015C (DAI)	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH100309.D	1	06/08/15	XPL	n/a	n/a	GGH4888
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	100	25	ug/l	
67-56-1	Methanol	ND	200	45	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	97%		48-150%
111-27-3	Hexanol	98%		48-150%

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N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	A-2R(2)		
Lab Sample ID:	JB96432-5	**Date Sampled:**	06/04/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U195961.D	1	06/11/15	NH	n/a	n/a	VU9037
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	3.6	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	7.1	1.0	0.17	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		76-120%
17060-07-0	1,2-Dichloroethane-D4	102%		73-122%
2037-26-5	Toluene-D8	99%		84-119%
460-00-4	4-Bromofluorobenzene	99%		78-117%

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RL = Reporting Limit
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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	A-2R(2)		
Lab Sample ID:	JB96432-5	**Date Sampled:**	06/04/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846-8015C (DAI)	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH100322.D	1	06/09/15	XPL	n/a	n/a	GGH4889
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	100	25	ug/l	
67-56-1	Methanol	ND	200	45	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	95%		48-150%
111-27-3	Hexanol	95%		48-150%

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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S-31R(2)		
Lab Sample ID:	JB96432-6	**Date Sampled:**	06/05/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U196112.D	20	06/15/15	NH	n/a	n/a	VU9043
Run #2	U196117.D	200	06/15/15	NH	n/a	n/a	VU9043

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	200	66	ug/l	
71-43-2	Benzene	ND	10	4.7	ug/l	
100-41-4	Ethylbenzene	5660 [a]	200	54	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	100	20	ug/l	
108-88-3	Toluene	ND	20	3.2	ug/l	
1330-20-7	Xylene (total)	ND	20	3.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%	104%	76-120%
17060-07-0	1,2-Dichloroethane-D4	100%	102%	73-122%
2037-26-5	Toluene-D8	100%	99%	84-119%
460-00-4	4-Bromofluorobenzene	97%	98%	78-117%

(a) Result is from Run# 2

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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	S-31R(2)		
Lab Sample ID:	JB96432-6	**Date Sampled:**	06/05/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846-8015C (DAI)	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH100325.D	1	06/09/15	XPL	n/a	n/a	GGH4889
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	100	25	ug/l	
67-56-1	Methanol	ND	200	45	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	106%		48-150%
111-27-3	Hexanol	101%		48-150%

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Accutest Laboratories

Report of Analysis

Client Sample ID:	S-31R(2)D		
Lab Sample ID:	JB96432-7	**Date Sampled:**	06/05/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U196033.D	20	06/12/15	NH	n/a	n/a	VU9040
Run #2	U195994.D	100	06/11/15	NH	n/a	n/a	VU9038

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	200	66	ug/l	
71-43-2	Benzene	ND	10	4.7	ug/l	
100-41-4	Ethylbenzene	4740 [a]	100	27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	100	20	ug/l	
108-88-3	Toluene	ND	20	3.2	ug/l	
1330-20-7	Xylene (total)	ND	20	3.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%	103%	76-120%
17060-07-0	1,2-Dichloroethane-D4	102%	102%	73-122%
2037-26-5	Toluene-D8	99%	100%	84-119%
460-00-4	4-Bromofluorobenzene	96%	97%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	S-31R(2)D		
Lab Sample ID:	JB96432-7	**Date Sampled:**	06/05/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846-8015C (DAI)	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH100326.D	1	06/09/15	XPL	n/a	n/a	GGH4889
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	ND	100	25	ug/l	
67-56-1	Methanol	ND	200	45	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	113%		48-150%
111-27-3	Hexanol	107%		48-150%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	VP-1		
Lab Sample ID:	JB96432-8	**Date Sampled:**	06/05/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U195962.D	1	06/11/15	NH	n/a	n/a	VU9037
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	5.2	10	3.3	ug/l	J
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	0.31	1.0	0.27	ug/l	J
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	0.89	1.0	0.17	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		76-120%
17060-07-0	1,2-Dichloroethane-D4	102%		73-122%
2037-26-5	Toluene-D8	99%		84-119%
460-00-4	4-Bromofluorobenzene	99%		78-117%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	VP-1		
Lab Sample ID:	JB96432-8	**Date Sampled:**	06/05/15
Matrix:	AQ - Ground Water	**Date Received:**	06/06/15
Method:	SW846-8015C (DAI)	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GH100327.D	1	06/09/15	XPL	n/a	n/a	GGH4889
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
67-63-0	Isopropyl Alcohol	1070	100	25	ug/l	
67-56-1	Methanol [a]	602	200	45	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
111-27-3	Hexanol	121%		48-150%
111-27-3	Hexanol	122%		48-150%

(a) More than 40 % RPD for detected concentrations between the two GC columns.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	TB060515		
Lab Sample ID:	JB96432-9	**Date Sampled:**	06/05/15
Matrix:	AQ - Trip Blank Water	**Date Received:**	06/06/15
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U195960.D	1	06/11/15	NH	n/a	n/a	VU9037
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA Special List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10	3.3	ug/l	
71-43-2	Benzene	ND	0.50	0.24	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.27	ug/l	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	5.0	1.0	ug/l	
108-88-3	Toluene	ND	1.0	0.16	ug/l	
1330-20-7	Xylene (total)	ND	1.0	0.17	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		76-120%
17060-07-0	1,2-Dichloroethane-D4	101%		73-122%
2037-26-5	Toluene-D8	99%		84-119%
460-00-4	4-Bromofluorobenzene	100%		78-117%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: U195956.D U195957.D

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: JB96432
Account: AMANYWP Anderson, Mulholland & Associates
Project: BMSMC, Building 5 Area, PR

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
JB96432-1MS	U195956.D	1	06/10/15	NH	n/a	n/a	VU9037
JB96432-1MSD	U195957.D	1	06/10/15	NH	n/a	n/a	VU9037
JB96432-1	U195959.D	1	06/11/15	NH	n/a	n/a	VU9037

The QC reported here applies to the following samples: **Method:** SW846 8260C

JB96432-1, JB96432-2, JB96432-3, JB96432-5, JB96432-8, JB96432-9

CAS No.	Compound	JB96432-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		50	45.0	90	50	57.0	114	24* [a]	33-158/19
71-43-2	Benzene	ND		50	50.9	102	50	50.0	100	2	43-138/12
100-41-4	Ethylbenzene	ND		50	55.9	112	50	55.4	111	1	38-139/12
108-10-1	4-Methyl-2-pentanone(MIBK)	ND		50	47.8	96	50	47.4	95	1	68-139/12
108-88-3	Toluene	ND		50	54.3	109	50	53.6	107	1	51-136/13
1330-20-7	Xylene (total)	ND		150	173	115	150	171	114	1	46-137/12

CAS No.	Surrogate Recoveries	MS	MSD	JB96432-1	Limits
1868-53-7	Dibromofluoromethane	104%	102%	102%	76-120%
17060-07-0	1,2-Dichloroethane-D4	103%	101%	101%	73-122%
2037-26-5	Toluene-D8	100%	100%	99%	84-119%
460-00-4	4-Bromofluorobenzene	96%	95%	99%	78-117%

(a) Outside control limits due to matrix interference.

* = Outside of Control Limits.

Raw Data: GH100305.D GH100306.D

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: JB96432
Account: AMANYWP Anderson, Mulholland & Associates
Project: BMSMC, Building 5 Area, PR

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
JB96432-1MS	GH100305.D	1	06/08/15	XPL	n/a	n/a	GGH4888
JB96432-1MSD	GH100306.D	1	06/08/15	XPL	n/a	n/a	GGH4888
JB96432-1	GH100304.D	1	06/08/15	XPL	n/a	n/a	GGH4888

The QC reported here applies to the following samples: **Method:** SW846-8015C (DAI)

JB96432-1, JB96432-2, JB96432-3, JB96432-4

CAS No.	Compound	JB96432-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-63-0	Isopropyl Alcohol	ND		5000	5280	106	5000	5520	110	4	58-140/20
67-56-1	Methanol	ND		5000	6000	120	5000	6140	123	2	47-151/29

CAS No.	Surrogate Recoveries	MS	MSD	JB96432-1	Limits
111-27-3	Hexanol	100%	107%	86%	48-150%
111-27-3	Hexanol	96%	109%	88%	48-150%

* = Outside of Control Limits.

GW
WTB

CHAIN OF CUSTODY

Fresh Ponds Corporate Village, Building B
2235 Route 130, Dayton, NJ 08810
732-329-0200 FAX: 732-329-3499/3480

Accutest Job #: JB96432
Accutest Quote #:

Client Information	Facility Information
Anderson Mulholland & Associates	Anderson Mulholland and Associates Inc.
Name: 2700 Westchester Avenue	Project Name:
Address: Purchase NY 10577	Location:
City: Terry Taylor State: Zip:	Project/PO #: BMS: Building 5 Area
Send Report to:	
Phone #: 914-251-0400	FAX #: 914-251-1286

Field ID / Point of Collection	Collection Date	Collection Time	Sampled By	Matrix	# of bottles	Preservation HCL	Preservation NaOH	Preservation HNO3	Preservation H2SO4	Preservation None	VOCs (Special List 3)	Analytical Information
S-33	6/3/15	1342	NMR	GW	6	X					X	
-1 S-33 MS		1351	NMR	GW	6	X					X	
S-33 MSD		1358	NMR	GW	6	X					X	
-2 S-32		1512	NMR	GW	6	X					X	V150
-3 G-1R(3)	6/3/15	1711	NMR	GW	6	X					X	
-4 A-1R(4)	6/4/15	1400	NMR	GW	6	X					X	
-5 A-2R(2)	6/4/15	1640	NMR	GW	6	X					X	
-6 S-31R(2)	6/5/15	1301	NMR	GW	6	X					X	
-7 S-31R(2) D		1313	NMR	GW	6	X					X	
-8 UP-1		1511	NMR	GW	6	X					X	
-9 TB060515	6/5/15	1511	NMR	QC	2	X					X	

INITIAL ASESSMENT 3B DCM
LABEL VERIFICATION DK

Turnaround Information	Approved By:	Data Deliverable Information		Comments / Remarks
[X] 21 Day Standard		[ ] NJ Reduced	[ ] Commercial "A"	Federal Express ID # 801219534541
[ ] 14 Day		[X] NJ Full	[ ] Commercial "B"	Lab Trip Blank Date 6/1/15 Time 1500
[ ] 7 Days EMERGENCY		[ ] FULL CLP	[ ] ASP Category B	VOC's samples collected in 40 ml. glass vials, provided by the lab. Analyze for Special List 3 compounds (acetone, benzene, ethylbencene, toluene, MIBK, xylene, IPA and methanol). Also, please provide report on CD ROM.
[ ] Other ____ (Days)		[ ] Disk Deliverable	[ ] State Forms	
RUSH TAT is for FAX data unless previously approved.		[ ] Other (Specify)		

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 Kristen M Rivera	6/5/15 1622	1 FX	2 FX	6/6/15 10:10	2
3		3	4		4
5		5	Seal # 786	Preserved where applicable: Yes	On Ice: Yes 4.3°C

5.1 5

DATA REVIEW WORKSHEETS

Project Number:____JB96432_____
Date:_____06/03-05/2015_____

REVIEW OF VOLATILE ORGANIC PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: USEPA Region 2, SOP HW-24, Standard Operating Procedure for the Validation of Organic Data Acquired using SW-846 Method 8260B (August, 2009-Revision 2), the USEPA National Functional Guidelines for Low/Medium Concentration Organic Data Review (SOW SOM01.2 SOP HW-33, August 2009 – Revision 2), the USEPA National Functional Guidelines for Organic Data Review for Low Concentration Water (SOP HW-13, August, 2009-Revision 3). Also, QC criteria from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846 (Final Update III, December 1996)," specifically for Methods 8000/8260B are utilized. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) _Accutest_____ data package received has been reviewed and the quality control and performance data summarized. The data review for VOCs included:

Lab. Project/SDG No.: __JB96432_____ Sample matrix: ___Groundwater_____
No. of Samples: _____11_____

Trip blank No.: ___JB96432-9_____
Field blank No.: _____-_____
Equipment blank No.:_____-_____
Field duplicate No.:____JB96432-6/JB96432-7_____

___X___ Data Completeness
___X___ Holding Times
___X___ GC/MS Tuning
___X___ Internal Standard Performance
___X___ Blanks
___X___ Surrogate Recoveries
___X___ Matrix Spike/Matrix Spike Duplicate
___X___ Laboratory Control Spikes
___X___ Field Duplicates
___X___ Calibrations
___X___ Compound Identifications
___X___ Compound Quantitation
___X___ Quantitation Limits

Overall Comments:_Selected_VOC's_by_SW846-8260C_____

Definition of Qualifiers:
J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer:_____
Date:_____06/30/2015_____

DATA REVIEW WORKSHEETS

DATA COMPLETENESS

MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED

All criteria were met __X__
Criteria were not met
and/or see below _____

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE ANALYZED	pH	ACTION
All samples analyzed within the recommended method holding time				

Criteria

Aqueous samples – 14 days from sample collection for preserved samples (pH $\leq$ 2, 4°C), no air bubbles.
Aqueous samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles.
Soil samples- 14 days from sample collection.
Cooler temperature (Criteria: 4 $\pm$ 2 °C): 4 °C - OK

Actions

If the VOCs vial(s) have air bubbles, estimate positive results (J) and reject nondetects (R).
If the % solids of soil samples is 10-50%, estimates positive results (J) and nondetects (UJ)
If the % solid of soil samples is < 10%, estimate positive results (J) and reject nondetects (R).
If holding times are exceeded but < 14 days beyond criteria, estimate positive results (J) and nondetects (UJ).
If holding times are exceeded but < 28 days beyond criteria, estimate positive results (J) and reject nondetects (R).
If holding times are grossly exceeded (> 28 days beyond criteria), reject all results (R).
If samples were not iced or if the ice were melted (> 10°C), estimate positive results (J) and nondetects (UJ).

All criteria were met __X__
Criteria were not met see below _____

GC/MS TUNING

The assessment of the tuning results is to determine if the sample instrumentation is within the standard tuning QC limits

__X___ The BFB performance results were reviewed and found to be within the specified criteria.

__X___ BFB tuning was performed for every 12 hours of sample analysis.

If no, use professional judgment to determine whether the associated data should be accepted, qualified or rejected.

List the samples affected:
_____

If mass calibration is in error, all associated data are rejected.

All criteria were met __X__
Criteria were not met
and/or see below _____

CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____05/01/15_____
Dates of continuing calibration:____06/10/15;_06/11/15;_06/12/15;_06/15/15;_06/17/15__
Instrument ID numbers:_____GCMSU_____
Matrix/Level:_____Aqueous/low_____

DATE	LAB FILE ID#	CRITERIA OUT RFs, %RSD, %D, r	COMPOUND	SAMPLES AFFECTED
Initial and continuing calibration meets method performance criteria.				

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.
All %RSD must be $\leq$ 15 % regardless of method requirements for CCC.
All %Ds must be $\leq$ 20% regardless of method requirements for CCC.
It should be noted that Region 2 SOP HW-24 does not specify criterion for the curve correlation coefficient (r). A limit for r of $\geq$ 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.
If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.
If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 20%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 20%, estimate positive results (J) and nondetects (UJ).
If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has r < 0.995, estimate positive results and nondetects.

A separate worksheet should be filled for each initial curve

All criteria were met __X____
Criteria were not met
and/or see below _____

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
All_method_blank_meeth_method_specific_criteria				

Field/Equipment/Trip blank

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
_No_target_analytes_detected_in_the_trip_blank_analyzed_as_part_of_this_data_package._No_ _field/equipment_blanks_analyzed_with_this_data_package.				

All criteria were met ___X___
Criteria were not met
and/or see below _____

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

ALs = 10x the amount of common contaminants (methylene chloride, acetone, 2-butanone, and toluene)
ALs = 5x for any other compounds

Specific actions are as follows:

If the concentration is < sample quantitation limit (SQL) and $\leq$ AL, report the compound as not detected (U) at the SQL.
If the concentration is $\geq$ SQL but $\leq$ AL, report the compound as not detected (U) at the reported concentration.
If the concentration is $\geq$ SQL and > AL, report the concentration unqualified.

Notes:

High and low level blanks must be treated separately
Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

CONTAMINATION SOURCE/LEVEL	COMPOUND	CONC/UNITS	AL/UNITS	SQL	AFFECTED SAMPLES

All criteria were met __X__
Criteria were not met
and/or see below _____

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.
List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.
Matrix: solid/aqueous

SAMPLE ID	SURROGATE COMPOUND				ACTION
	1,2-DCA	DBFM	TOL-d8	BFB	
_All_surrogate_recoveries_within_laboratory_control_limits_____					

QC Limits* (Aqueous)
_____LL_to_UL___ ____to_____ ___to_____ ___to_____ ___to_____
QC Limits* (Solid-Low)
_____LL_to_UL___ ____to_____ ___to_____ ___to_____ ___to_____
QC Limits* (Solid-Med)
_____LL_to_UL___ ____to_____ ___to_____ ___to_____ ___to_____

1,2-DCA = 1,2-Dichloromethane-d4
DBFM = Dibromofluoromethane
TOL-d8 = Toluene-d8
BFB = Bromofluorobenzene

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 80 – 120 % for aqueous and 70 – 130 % for solid samples.

Actions:

QUALITY	%R < 10%	%R = 10% - LL	%R > UL
Positive results	J	J	J
Nondetects results	R	UJ	Accept

Surrogate action should be applied:
If one or more surrogate in the VOC fraction is out of specification, but has a recovery of > 10%.
If any one surrogate in a fraction shows < 10 % recovery.

All criteria were met ___X___
Criteria were not met
and/or see below _____

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.

Sample ID:__JB96432-1MS/-1MSD_____ Matrix/Level:___GROUNDWATER_____
Sample ID:__JB96173-3MS/-3MSD_____ Matrix/Level:___GROUNDWATER_____
Sample ID:__JB89632-7MS/-7MSD_____ Matrix/Level:___GROUNDWATER_____
Sample ID:__JB89632-6MS/-6MSD_____ Matrix/Level:___GROUNDWATER_____
Sample ID:__JB89878-3MS/-3MSD_____ Matrix/Level:___GROUNDWATER_____

MS OR MSD	COMPOUND	% R	RPD	QC LIMITS	ACTION
_MS/MSD-recoveries_and_RPD_within_laboratory_control_limits_except_for_the_following:_____					
JB96432-1MS/-1MSD					
_MS/MSD_____	Acetone_____	24____	19_____		No_action_____

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).
If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).
If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

All criteria were met __X__
Criteria were not met
and/or see below _____

VII. B MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD – Unspiked Compounds

It should be noted that Region 2 SOP HW-24 does not specify a MS/MSD criteria for the unspiked compounds in the sample. A %RSD of < 50% has therefore been utilized as professional judgment.

If all target analytes were spiked in the MS/MSD, this review element is not applicable.

List the %RSD of the compounds which do not meet the criteria.

Sample ID:_____ Matrix/Level/Unit:_____

COMPOUND	SAMPLE CONC.	MS CONC.	MSD CONC.	% RSD	ACTION

Actions:

* If the % RSD > 50, qualify the positive result in the unspiked samples as estimated (J).
* If the % RSD is not calculated (NC) due to nondetected value, use professional judgment to qualify the data.

All criteria were met __X__
Criteria were not met
and/or see below _____

VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? Yes or No. If no make note in data review memo.
List the %R of compounds which do not meet the criteria

LCS ID COMPOUND % R QC LIMIT

___Recoveries_(blank_spike)_within_laboratory_control_limits_____

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).
If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? Yes or No.
If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

All criteria were met __X___
Criteria were not met
and/or see below _____

IX. FIELD DUPLICATE PRECISION

Sample IDs: __JB96432-6/JB96432-7__ Matrix:_Groundwater__

Field duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.
Suggested criteria: RPD $\pm$ 30% for aqueous samples, RPD $\pm$ 50 % for solid samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
RPD within laboratory and generally acceptable control limits.					

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met __N/A___
Criteria were not met
and/or see below _____

IX. LABORATORY DUPLICATE PRECISION

Sample IDs: _____-_____ Matrix:___-_____

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.
Suggested criteria: RPD $\pm$ 30% for aqueous samples, RPD $\pm$ 50 % for solid samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met _X___
Criteria were not met
and/or see below _____

X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

* Area of +100% or -50% of the IS area in the associated calibration standard.
* Retention time (RT) within 30 seconds of the IS area in the associated calibration standard.

DATE	SAMPLE ID	IS OUT	IS AREA	ACCEPTABLE RANGE	ACTION

_Internal_standard_area_within_laboratory_control_limits_____

Actions:

1. IS actions should be applied to the compound quantitated with the out-of-control ISs

QUALITY	IS AREA < -25%	IS AREA = -25 % TO – 50%	IS AREA > + 100%
Positive results	J	J	J
Nondetected results	R	UJ	ACCEPT

2. If a IS retention time varies more than 30 seconds, the chromatographic profile for that sample must be examined to determine if any false positive or negative exists. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for the sample fraction.

All criteria were met __X__
Criteria were not met
and/or see below _____

XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

JB96432-2

Toluene RF = 0.773

[ ] = (2018)(50)/(381187)(0.773)

= 0.342 ppb OK

All criteria were met __X__
Criteria were not met
and/or see below _____

XII. QUANTITATION LIMITS

A. Dilution performed

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION
JB96432-2	200 X; 2000 X	Analytes outside calibration range
JB96432-3	200 X; 2000 X	Analytes outside calibration range
JB96432-4	4 X	Analytes outside calibration range
JB96432-6	20 X; 200 X	Analytes outside calibration range
JB96432-7	20 X; 100 X	Analytes outside calibration range

B. Percent Solids

List samples which have $\leq$ 50 % solids

Actions:

If the % solids of a soil sample is 10-50%, estimate positive results (J) and nondetects (UJ)

If the % solids of a soil sample is < 10%, estimate positive results (J) and reject nondetects (R)

DATA REVIEW WORKSHEETS

Project Number:___JB96432_____
Date:_____06/03-05/2015_____

REVIEW OF VOLATILE ORGANIC PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: USEPA Region 2, SOP HW-24, Standard Operating Procedure for the Validation of Organic Data Acquired using SW-846 Method 8260B (August, 2009-Revision 2), the USEPA National Functional Guidelines for Low/Medium Concentration Organic Data Review (SOW SOM01.2 SOP HW-33, August 2009 – Revision 2), the USEPA National Functional Guidelines for Organic Data Review for Low Concentration Water (SOP HW-13, August, 2009-Revision 3). Also, QC criteria from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846 (Final Update III, December 1996)," specifically for Methods 8000/8260B are utilized. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) _Accutest_____ data package received has been reviewed and the quality control and performance data summarized. The data review for VOCs included:

Lab. Project/SDG No.: __JB96432_____ Sample matrix: ___Groundwater_____
No. of Samples: _____10_____

Trip blank No.: _____JB96432-9_____
Field blank No.: _____
Equipment blank No.:_____
Field duplicate No.:___JB96432-6/JB96432-7_____

___X___ Data Completeness
___X___ Holding Times
___N/A_ GC/MS Tuning
___N/A_ Internal Standard Performance
___X___ Blanks
___X___ Surrogate Recoveries
___X___ Matrix Spike/Matrix Spike Duplicate
___X___ Laboratory Control Spikes
___X___ Field Duplicates
___X___ Calibrations
___X___ Compound Identifications
___X___ Compound Quantitation
___X___ Quantitation Limits

Overall Comments:_Selected_alcohols_(Isopropyl_alcohol_and_Methanol)_by_SW-846_8015C_(DAI)_____

Definition of Qualifiers:
J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer:_____
Date:__06/30/2015_____

DATA REVIEW WORKSHEETS

DATA COMPLETENESS

MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED

All criteria were met __X__
Criteria were not met
and/or see below _____

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE ANALYZED	pH	ACTION
All samples analyzed within the recommended method holding time				

Criteria

Aqueous samples – 14 days from sample collection for preserved samples (pH $\leq$ 2, 4°C), no air bubbles.
Aqueous samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles.
Soil samples- 7 days from sample collection.
Cooler temperature (Criteria: 4 $\pm$ 2 °C): 4°C

Actions

If the VOCs vial(s) have air bubbles, estimate positive results (J) and reject nondetects (R).
If the % solids of soil samples is 10-50%, estimates positive results (J) and nondetects (UJ)
If the % solid of soil samples is < 10%, estimate positive results (J) and reject nondetects (R).
If holding times are exceeded but < 14 days beyond criteria, estimate positive results (J) and nondetects (UJ).
If holding times are exceeded but < 28 days beyond criteria, estimate positive results (J) and reject nondetects (R).
If holding times are grossly exceeded (> 28 days beyond criteria), reject all results (R).
If samples were not iced or if the ice were melted (> 10°C), estimate positive results (J) and nondetects (UJ).

All criteria were met __N/A__
Criteria were not met see below _____

GC/MS TUNING

The assessment of the tuning results is to determine if the sample instrumentation is within the standard tuning QC limits

__N/A_ The BFB performance results were reviewed and found to be within the specified criteria.

__N/A_ BFB tuning was performed for every 12 hours of sample analysis.

If no, use professional judgment to determine whether the associated data should be accepted, qualified or rejected.

List the samples affected:
_____

If mass calibration is in error, all associated data are rejected.

All criteria were met _X_
Criteria were not met
and/or see below ____

CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____05/19/15_____
Dates of continuing calibration:_06/08/15;_06/08/15____
Instrument ID number:_____GCGH_____
Matrix/Level:_____Aqueous/low_____

DATE	LAB FILE ID#	CRITERIA OUT RFs, %RSD, %D, r	COMPOUND	SAMPLES AFFECTED
Initial and continuing calibration meet method specific criteria				

Criteria

All RFs must be > 0.05 regardless of method requirements for SPCC.
All %RSD must be $\leq$ 15 % regardless of method requirements for CCC.
All %Ds must be $\leq$ 20% regardless of method requirements for CCC.
It should be noted that Region 2 SOP HW-24 does not specify criterion for the curve correlation coefficient (r). A limit for r of $\geq$ 0.995 has therefore been utilized as professional judgment.

Actions

If any compound has an initial RF or a continuing RF of < 0.05, estimate positive results (J) and reject nondetects (R), regardless of method requirements.
If any compound has a %RSD > 15%, estimate positive results (J) and use professional judgment to qualify nondetects.
If any compound has a %RSD > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 20%, estimate positive results (J) and reject nondetects (R).
If any compound has a % D > 20%, estimate positive results (J) and nondetects (UJ).
If any compound has a % D > 90%, estimate positive results (J) and reject nondetects (R).
If any compound has r > 0.995, estimate positive results and nondetects.

A separate worksheet should be filled for each initial curve

All criteria were met __X__
Criteria were not met
and/or see below _____

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
All_method_blank_meeth_method_specific_criteria				

Field/Equipment/Trip blank

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
_No_equipment/trip/field_blanks_analyzed_with_this_data_package.				

All criteria were met __X__
Criteria were not met
and/or see below _____

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

ALs = 10x the amount of common contaminants (methylene chloride, acetone, 2-butanone, and toluene)
ALs = 5x for any other compounds

Specific actions are as follows:

If the concentration is < sample quantitation limit (SQL) and ≤ AL, report the compound as not detected (U) at the SQL.
If the concentration is ≥ SQL but ≤ AL, report the compound as not detected (U) at the reported concentration.
If the concentration is ≥ SQL and > AL, report the concentration unqualified.

Notes:

High and low level blanks must be treated separately
Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

CONTAMINATION SOURCE/LEVEL	COMPOUND	CONC/UNITS	AL/UNITS	SQL	AFFECTED SAMPLES

All criteria were met _____
Criteria were not met
and/or see below ___X____

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.
List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.
Matrix: solid/aqueous

SAMPLE ID	SURROGATE COMPOUND				ACTION
	Hexanol	~~DBFM~~	~~TOL-d8~~	~~BFB~~	

_All_surrogate_recoveries_within_laboratory_control_limits._____
_____
_____
_____
_____
_____

QC Limits* (Aqueous)
_____LL_to_UL___ _48_to_150_ ___to_____ ___to_____ ___to_____
QC Limits* (Solid-Low)
_____LL_to_UL___ ____to_____ ___to_____ ___to_____ ___to_____
QC Limits* (Solid-Med)
_____LL_to_UL___ ____to_____ ___to_____ ___to_____ ___to_____

1,2-DCA = 1,2-Dichloromethane-d4 TOL-d8 = Toluene-d8
DBFM = Dibromofluoromethane BFB = Bromofluorobenzene

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 80 – 120 % for aqueous and 70 – 130 % for solid samples.

Actions:

QUALITY	%R < 10%	%R = 10% - LL	%R > UL
Positive results	J	J	J
Nondetects results	R	UJ	Accept

Surrogate action should be applied:

If one or more surrogate in the VOC fraction is out of specification, but has a recovery of > 10%.
If any one surrogate in a fraction shows < 10 % recovery.

All criteria were met __X___
Criteria were not met
and/or see below _____

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.

Sample ID:__JB96432-1MS/1MSD_____ Matrix/Level:___Groundwater_____
Sample ID:__JB96432-5MS/5MSD_____ Matrix/Level:___Groundwater_____

MS OR MSD	COMPOUND	% R	RPD	QC LIMITS	ACTION

Note: MS/MSD recoveries and RPD within laboratory control limits.

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).

If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).

If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

All criteria were met __X__
Criteria were not met
and/or see below _____

VII. B MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD – Unspiked Compounds

It should be noted that Region 2 SOP HW-24 does not specify a MS/MSD criteria for the unspiked compounds in the sample. A %RSD of < 50% has therefore been utilized as professional judgment.

If all target analytes were spiked in the MS/MSD, this review element is not applicable.

List the %RSD of the compounds which do not meet the criteria.

Sample ID:_____ Matrix/Level/Unit:_____

COMPOUND	SAMPLE CONC.	MS CONC.	MSD CONC.	% RSD	ACTION

Actions:

* If the % RSD > 50, qualify the positive result in the unspiked samples as estimated (J).
* If the % RSD is not calculated (NC) due to nondetected value, use professional judgment to qualify the data.

All criteria were met __X__
Criteria were not met
and/or see below _____

VIII. LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? Yes or No. If no make note in data review memo.
List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT

___Recoveries_within_laboratory_control_limits._____

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).
If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? Yes or No.
If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

All criteria were met ___X___
Criteria were not met
and/or see below _____

IX. FIELD DUPLICATE PRECISION

Sample IDs: __JB96432-6/JB96432-7_____ Matrix:____Groundwater_____

Field duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.
Suggested criteria: RPD ± 30% for aqueous samples, RPD ± 50 % for solid samples. If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
RPD within laboratory and generally acceptable control limits.					

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions apply:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met __N/A___
Criteria were not met
and/or see below _____

X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

List the internal standard area of samples which do not meet the criteria.

* Area of +100% or -50% of the IS area in the associated calibration standard.
* Retention time (RT) within 30 seconds of the IS area in the associated calibration standard.

DATE	SAMPLE ID	IS OUT	IS AREA	ACCEPTABLE RANGE	ACTION

Actions:

1. IS actions should be applied to the compound quantitated with the out-of-control ISs

QUALITY	IS AREA < -25%	IS AREA = -25 % TO – 50%	IS AREA > + 100%
Positive results	J	J	J
Nondetected results	R	UJ	ACCEPT

2. If a IS retention time varies more than 30 seconds, the chromatographic profile for that sample must be examined to determine if any false positive or negative exists. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for the sample fraction.

All criteria were met __X__
Criteria were not met
and/or see below _____

XII. SAMPLE QUANTITATION

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

JB96432-8

Methanol RF = 14.57

[ ] = (8779)/(14.87)

= 602.5 ppb OK

Note: Methanol detected concentration more than 40 % RPD difference between the two columns.

All criteria were met __X___
Criteria were not met
and/or see below _____

XII. QUANTITATION LIMITS

A. Dilution performed

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION

B. Percent Solids

List samples which have ≤ 50 % solids

Actions:

If the % solids of a soil sample is 10-50%, estimate positive results (J) and nondetects (UJ)

If the % solids of a soil sample is < 10%, estimate positive results (J) and reject nondetects (R)